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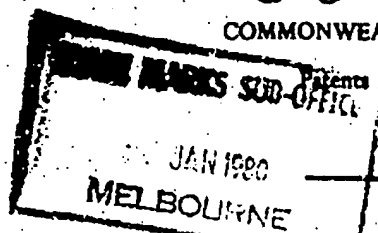
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COMMONWEALTH OF AUSTRALIA



Patents Act 1952-1962

APPLICATION FOR A PATENT

(Combined Form - Convention and Non-Convention)

54288/80

W/We CATERPILLAR TRACTOR CO., a corporation organized and
 existing under the laws of the State of California, U.S.A., of
 100 N.E. Adams Street, Peoria, Illinois 61629, United States
 of America,
 hereby apply for the grant of a Patent for an invention entitled

"RELEASABLE CORNER TOOTH ASSEMBLY"

which is described in the accompanying ~~Revised~~ Complete Specification.

APPLICATION ACCEPTED AND AMENDED
 8/6/80
 ALLOWED

Strike out Para. 2,
 for non-convention

2. This application is a Convention Application and is based on the application(s) for a
 patent or similar protection made—

in _____
 on _____, numbered _____, and
 on _____, numbered _____, and
 on _____, numbered _____

3. My/Our address for service is: Care of COWIE, THOMSON & CARTER Patent
 Attorneys, of Suite 5, 65 Queens Road, Melbourne, Australia, 3004

DATED this 2nd day of January 1980.

COWIE, THOMSON & CARTER.

By:

Patent Attorneys for
 CATERPILLAR TRACTOR CO.

To the Commissioner of Patents,
 COMMONWEALTH OF AUSTRALIA

COWIE, THOMSON & CARTER

Patent Attorneys

Suite 5, 65 Queens Road
Melbourne, 3004
Australia

Declaration in Support of an Application for a Patent

(Combined Form - Convention and Non-Convention)

54288/80

* Strike out the
non-conventionIn support of the ~~Convention~~^{patent} application made for a ~~patent~~^{patent} for an
invention entitled RELEASABLE CORNER TOOTH ASSEMBLYI, Sona Lou Holt, Assistant Secretary of
Caterpillar Tractor Co.

do solemnly and sincerely declare as follows:-

1. ~~I am~~^{I am} the applicant(s) for the ~~patent~~^{patent}
~~We are~~^{We are} the applicant(s) for the ~~patent~~^{patent} of addition.

(or in the case of an application by a body corporate)

1. I am authorised by Caterpillar Tractor Co.the applicant for the ~~patent~~^{patent} to make this declaration on its behalf.Strike out Para. 2.
for non-convention2. The basic application(s) as defined by section 141 of the Act ~~was~~^{were} made at
inon the day of 19 , No. ,
by , and
on the day of 19 , No. ,
by , and
on the day of 19 , No. ,
by .3. ~~I am~~^{I am} the actual inventor(s) of the invention.
~~We are~~^{We are}

(or, where a person other than the inventor is the applicant)

3. Gene Ralph Klett and Jerome Albert Thies
of Rock Run Drive, R.R. #5 640 Oakwood Place
Joliet, Illinois 60436 Geneseo, Illinois 61254
United States of America United States of America4. ~~I am~~^{I am} the actual inventor(s) of the invention and the facts upon which ~~the~~^{the}
~~We are~~^{We are} said company is entitled to make the application are as
follows:-The said company is the assignee of the
invention from the said actual inventors.Strike out Para. 4.
for non-convention4. The basic application(s) referred to in paragraph 2 of this Declaration ~~was~~^{were} the first
application(s) made in a ~~Convention~~^{Convention} country in respect of the invention the subject of the
application.DECLARED AT Peoria, Illinois this 3rd day of
January 19 80Sona Lou Holt
Sona Lou Holt

Signature of Declarant

(54) EXCAVATOR-BUCKET TOOTH
(71) CATERPILLAR TRACTOR CO.
(21) 54288/80 531111 (22) 2.1.80
(24) 2.1.80
(43) 9.7.81 (44) 11.8.83
(51)³ E02F 9/28 E02F 3/36 E02F 3/81
(72) GENE RALPH KLETT AND JEROME ALBERT THIES
(74) CM
(57) Claim

1. A releasable corner tooth assembly of the type including an implement and an adapter; the implement having a normal forward longitudinal direction of working movement, an upright sidewall member and a laterally disposed cutting edge connected to the sidewall member; the adapter having a pair of laterally spaced outer and inner mounting portions defining a first slot therebetween, a bottom portion connected to the outer mounting portion and defining a second slot with the inner mounting portion, the first slot straddling the sidewall member and the second slot straddling the cutting edge; the improvement comprising;

step means including an upright face and a connecting forwardly depending inclined face defined in a forwardly extending edge of said sidewall member;

projection means for transmitting a portion of an external working force on said adapter into said step means of the sidewall member; and

first means for releasably connecting said adapter to said implement and transmitting another portion of said external working force into said sidewall member.

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PATENTS ACT 1952-1973

Form 10

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

Class:

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Lodged:

Complete Specification—Lodged:

Accepted:

Published:

Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant: CATERPILLAR TRACTOR CO., a corporation organized and existing under the laws of the State of California, U.S.A., of 100 N.E. Adams Street, Peoria, Illinois 61629, United States of America.

Address of Applicant:

Actual Inventor: GENE RALPH KLETT
JEROME ALBERT THIES

Address for Service: C/- COWIE, THOMSON & CARTER,
PATENT ATTORNEYS,
SUITE 5, 65 QUEENS ROAD,
MELBOURNE, VICTORIA, AUSTRALIA.

Complete Specification for the invention entitled:

RELEASABLE CORNER TOOTH ASSEMBLY

The following statement is a full description of this invention, including the best method of performing it known to me:—

Technical Field

The present invention is related to an earth-moving implement, and more particularly to a releasable corner tooth assembly therefor.

Background Art

Each corner of a work implement, such as a loader bucket, often has a hardened earthworking adapter and tip assembly thereat in order to increase the work capabilities of the implement and to also prolong the service life of the implement at the corners. As can be expected, relatively large working forces are generated upon the releasable tip, and the adapter conventionally transmits these forces rearwardly into the sidewall member and the cutting edge. Exemplifying the art in this area are the following patents: U.S. Patent No. 3,621,594 issued November 23, 1971 to F.C. Hahn, et al; U.S. Patent No. 3,812,608 issued May 28, 1974 to T.A. Ratkowski; U.S. Patent No. 4,007,550 issued February 15, 1977 to V.A. Stepe; and U.S. Patent No. 4,071,967 issued February 7, 1978 to R. Klett.

Such tip supporting adapters are usually releasably secured to the implement by one or more bolts, and in order to relieve the shearing forces on the bolts it has been heretofore deemed necessary in many cases to provide shear blocks or the like integrated into the corner constructions of the implement. These shear blocks, shown for example in the forementioned U.S. Patent 4,071,967, require additional costly manufacturing steps and are in the way when the earthworking adapters and tips are not needed on the implement.

Another problem that has been experienced with such constructions is that downward working forces of relatively high magnitude on the adapter and the tip are often transmitted directly upon the cutting edge. This has resulted in shortening the desired service life of the cutting edge.

Frequently, in order to minimize some of the aforementioned problems, the construction of the adapter and associated retaining devices becomes so complex so that not only is the cost undesirably high, but also

th service time required for field replacement is excessive.

The present invention is directed to overcoming one or more of the problems as set forth above.

5 Disclosure of Invention

In accordance with one aspect of the present invention, the releasable corner tooth assembly includes an implement having a sidewall member, a step defined in the sidewall member, and a cutting edge connected to the sidewall member. The assembly further includes an adapter having a pair of inner and outer mounting portions defining a first slot therebetween, a bottom portion connected to the outer mounting portion and defining a second slot with the inner mounting portion. With this construction the first slot straddles the sidewall member and the second slot straddles the cutting edge. Advantageously, a projection defined on the adapter transmits a portion of a working force on the adapter into the step of the sidewall member, and a fastening device releasably connects the adapter to the implement and transmits another portion of the working force into the sidewall member.

In another aspect of the invention, the adapter has an elongate body having a forward nose portion and a rear leg portion. A pair of laterally spaced outer and inner mounting portions are formed on the leg portion and define a first slot. A bottom portion formed on the leg portion extends laterally inwardly to define a second slot with the inner mounting portion. The adapter further defines a pair of laterally aligned openings in the outer and inner mounting portions, and a projection having first and second connected surfaces is located forwardly of the first slot.

35 Brief Description of Drawings

FIG. 1 is an exploded and diagrammatic isometric view of a releasable corner tooth assembly constructed in accordance with an embodiment of the present invention, including a fragmentary inside portion of a front corner of a loader bucket.

40 FIG. 2 is a diagrammatic, side elevational view of

the corner tooth assembly shown in FIG. 1, with portions broken open and sectioned in order to better illustrate details of construction thereof.

FIG. 3 is a diagrammatic vertical cross sectional view through the corner tooth assembly as taken along line III-III of FIG. 2.

FIG. 4 is a diagrammatic top plan view of the corner tooth assembly illustrated in FIGS. 1-3.

Best Mode For Carrying out the Invention

FIG. 1 illustrates a corner tooth assembly 8 constructed in accordance with the present invention and including a portion of one of the front corners of an earthmoving implement such as a loader bucket 10 having a normal forward longitudinal direction of working movement. The implement has an upright sidewall member 12 and a horizontally disposed cutting edge 14 connected to the lower edge of the sidewall as by inner and outer weld joints 16. Advantageously, the sidewall member 12 has a fastener-receiving cylindrical opening 18 laterally therethrough and a forwardly and upwardly facing step 20. Preferably, the step 20 has a substantially upright or vertical face 22 and an intersecting, forwardly descending or inclined face 24.

In general, the corner tooth assembly 8 includes an adapter 26 having a flat bottom skid surface 27, fastener means or a fastening device 28 for releasably connecting the adapter to the implement 10, and a conventional hardened earth penetrating tip 29 which is releasably connected to the adapter by a standard pin assembly 30.

More specifically, as shown in FIGS. 1 and 2, the adapter 26 has an elongate body 31 having a longitudinal axis 32 that is inclined or that descends in the forward direction relative to the bottom surface 27. A forward nose portion 33 and a rear leg portion 34 are formed integrally with the body. A pair of laterally spaced outer and inner mounting portions 35, 36 are formed on the rear leg portion and define a first slot 38 between them as is shown best in FIG. 4. A bottom portion 40 is integrally connected to the bottom of the outer mounting portion 35 and extends laterally inwardly to define a second slot 42 with the inner

mounting portion 36 as shown best in FIG. 3. In this way it is clear that the first slot 38 relatively closely straddles the side wall member 12, for example, having only about 1 mm clearance, and the second slot 42 relatively loosely straddles the cutting edge 14.

Referring to FIG. 3, the adapter 26 has first and second laterally aligned openings 44 and 46 through the outer and inner mounting portions 35, 36 respectively for receiving the fastener means 28. The first opening 44 includes an outer annular conical surface 48, that connects with an inner surface 50 of polygonal cross section, and the second opening 46 includes an inner cylindrical bore 52, an outer enlarged counter-bore 54, and an intermediate annular conical surface 56 therebetween. Preferably, the fastener means 28 includes a single plow bolt 58 which extends laterally inwardly through the openings 44, 48 and 46, and a nut 60 is screw threadably installed on the inner end thereof. A polygonal portion 62 of the bolt is advantageously received in the corresponding polygonal inner surface 50 to prevent rotation of the bolt during assembly or disassembly of the nut 60 and the adapter 26 to the implement 10. Moreover, conically tapered portions 64, 66 on the bolt and nut respectively contact the surfaces 48, 56 to permit relatively positive anchoring of first force transmitting means or a cylindrical bearing surface 68 of the bolt on the outer and inner mounting portions 35, 36 of the adapter. In this regard, the diametral clearance between the bearing surface 68 and the opening 48 is relatively tight, for example, 1.6 mm.

As shown in FIGS. 2 and 3, the adapter 26 has second force transmitting means 70 for transferring certain external working forces upwardly into a bottom surface 72 of the cutting edge 14. Preferably, the second force transmitting means includes an upstanding bearing surface or pad 74 formed on the upper inside part of the bottom portion 40 of the adapter. As shown in FIG. 2, a third force transmitting means 76 is preferably provided for transferring certain external working forces upwardly into the bottom surface of the cutting edge at a spaced location rearwardly of the second force transmitting means 70.

The third force transmitting means 76 preferably includes an upstanding bearing surface or pad 78 spaced rearwardly from the bearing pad 74.

In accordance with a major aspect of the invention, the corner tooth assembly 8 includes a fourth force transmitting means or projection means 80 for transmitting certain working forces on the adapter 26 primarily into the step 20 of the sidewall member 12. As shown best in FIG. 2, the projection means 80 preferably includes a substantially upright or vertical surface 82 and an intersecting, forwardly descending inclined surface 84, which surfaces are located generally forwardly of the first slot 38 or at the base of the first slot in the adapter. Thus, in use, the surface 82 is contiguous with the corresponding face 22 of the step, and the surface 84 is contiguous with the corresponding face 24 of the step. Moreover, as shown best in FIGS. 2 and 4, an embossment 86 extends integrally outwardly from the side of the adapter to provide increased sectional strength of the outer mounting portion 35 at the base of the first slot 38.

Industrial Applicability

Horizontal rearward forces F_1 imposed on the tip 29 from the usual earthmoving operations, as shown in FIG. 2, are transmitted to the adapter 26 and primarily directly against the sidewall member 12 of the implement 10 by the fourth force transmitting means 80. Particularly, as depicted by reaction force arrow F_1' , such forces are transmitted substantially fully by the abutment of upright surface 82 against the upright face 22. However, some relatively minor degree of force transmitting reaction can also be experienced by the first force transmitting means 68 at the bolt 58.

Upwardly directly forces F_2 imposed on the tip 30 and tending to rotate the adapter 26 in a counterclockwise direction when viewing FIG. 2 are transmitted from the adapter 26 to the implement 10 primarily by the second force transmitting means 70, and secondarily to a relatively limited degree by the first force transmitting means 68. Specifically, as depicted by the respective reaction force indicating arrows F_2' and F_2'' , such forces are transmitted

primarily by the bearing pad 74 into the bottom of the cutting edge 14, and secondarily by the reaction of the bolt 58 against the sidewall member 12. In this regard, it is to be appreciated that the central bearing surface 68 of the bolt is relatively closely received in the opening 18 in the sidewall member 12 to better transmit such reaction forces into the implement.

Furthermore, downwardly directed forces F_3 imposed on the tip 30 and tending to rotate the adapter in a clockwise direction when viewing FIG. 2 are transmitted from the adapter 26 to the implement 10 primarily by the fourth force transmitting means 80, and secondarily by the first force transmitting means 68. More particularly, as depicted by the reaction force indicating arrows F_3' and F_3'' , such forces are transmitted primarily by the abutment of the inclined surface 84 with the inclined face 24 and secondarily by the reaction of the bolt 58 against the sidewall member 12. It is of major importance to note that downward forces upon the adapter are not transmitted to the cutting edge 14 so that its service life is significantly extended. Reference is made, for example, to the vertical clearance provided between the cutting edge 14 and the inner mounting portion 36 as designated by the identifying letter C in FIG. 3 which prevents the transmission of such undesirable loading.

The third force transmitting means 76 can be useful, for example, should upward forces F_4 be experienced at the rear of the adapter 26. In that case, the bearing pad 78 can abut the bottom surface 72 of the cutting edge 14 to simultaneously share the reaction of the first force transmitting means 68 against the sidewall member 12 and the second force transmitting means 70 against the bottom surface of the cutting edge. Hence, the third force transmitting means 76 can serve to protect the bolt 58 from undesirably high loads.

While in the instant example a separate tip 29 is releasably connected to the adapter 26 by the quick-release pin assembly 30, we contemplate that the nose portion 33 can be enlarged to provide an integral, forwardly extending hardened tip on the adapter for earth penetrating purposes without departing from the spirit of the present invention.

Other aspects, objects and advantages will become apparent from a study of the specification, drawings and appended claims.

The claims defining the invention are as follows :-

1. A releasable corner tooth assembly of the type including an implement and an adapter; the implement having a normal forward longitudinal direction of working movement, an upright sidewall member and a laterally disposed cutting edge connected to the sidewall member; the adapter having a pair of laterally spaced outer and inner mounting portions defining a first slot therebetween, a bottom portion connected to the outer mounting portion and defining a second slot with the inner mounting portion, the first slot straddling the sidewall member and the second slot straddling the cutting edge; the improvement comprising;

step means including an upright face and a connecting forwardly depending inclined face defined in a forwardly extending edge of said sidewall member;

projection means for transmitting a portion of an external working force on said adapter into said step means of the sidewall member; and

first means for releasably connecting said adapter to said implement and transmitting another portion of said external working force into said sidewall member.

2. The corner tooth assembly of claim 1 wherein said projection means includes an upright surface and a connecting forwardly depending inclined surface, said inclined surface being engageable against said inclined face of said step means.

3. The corner tooth assembly of claim 1 wherein said first means includes a bolt extending through said outer and inner mounting portions and said sidewall member.

4. The corner tooth assembly of claim 1 including a second means for transmitting upward forces on said adapter to said cutting edge, said second means being defined on said adapter.

5. The corner tooth assembly of claim 4 wherein said second means includes an upstanding bearing pad on said bottom portion of said adapter.

6. The corner tooth assembly of claim 5 including a second upstanding bearing pad on said bottom portion, said second bearing pad being spaced longitudinally rearwardly of said first bearing pad.



7. A releasable corner tooth assembly of the type including an implement and an adapter; the implement having a normal forward longitudinal direction of working movement, an upright sidewall member and a laterally disposed cutting edge connected to the sidewall member; the adapter having a pair of laterally spaced outer and inner mounting portions defining a first slot therebetween, a bottom portion connected to the outer mounting portion and defining a second slot with the inner mounting portion, the first slot straddling the sidewall member and the second slot straddling the cutting edge; the improvement comprising:

a forwardly and upwardly facing step defined in a forwardly extending edge of said sidewall member;

a rearwardly and downwardly facing projection defined on said adapter having a construction sufficient for transmitting a primary portion of a downward working force on said adapter into said step; and

a fastening device releasably connecting said adapter to said implement and transmitting a lesser proportion of said downward working force than said primary portion into said sidewall member.

8. The corner tooth assembly of claim 7 wherein said projection includes an upright surface and a forwardly depending inclined surface, both of said surfaces being located generally forwardly of said first slot.

9. The corner tooth assembly of claim 8 including laterally aligned opening means defined in said outer and inner mounting portions and in said sidewall member, said fastening device including a screw threadably releasable fastener extending through said opening means.

10. The corner tooth assembly of claim 7 including a raised bearing pad on said bottom portion of said adapter, said bearing pad being of a construction sufficient for transferring forces upwardly against said cutting edge.

11. An earthmoving adapter adapted for use on a work implement having a cutting edge secured forwardly on a bottom of the work implement and an upright sidewall connected to the bottom of the work implement comprising:

an elongate body having a substantially longitudinal axis, a forward nose portion and a rear leg portion;



a pair of laterally spaced outer and inner mounting portions formed on said rear leg portion and defining a first slot therebetween;

a bottom portion formed on said rear leg portion and extending laterally inwardly and defining a second slot with said inner mounting portion;

a pair of laterally aligned openings respectively formed in said outer and inner mounting portions; and

a projection having first and second connected surfaces ^{defining an obtuse angle and} formed on said adapter forwardly of said first slot, said first and second surfaces of said projection being adapted to contact said upright sidewall at a location spaced from the cutting edge.

12. A releasable corner tooth assembly substantially as hereinbefore described with reference to the accompanying drawings.

DATED this 21st day of January, 1983.

CATERPILLAR TRACTOR CO.



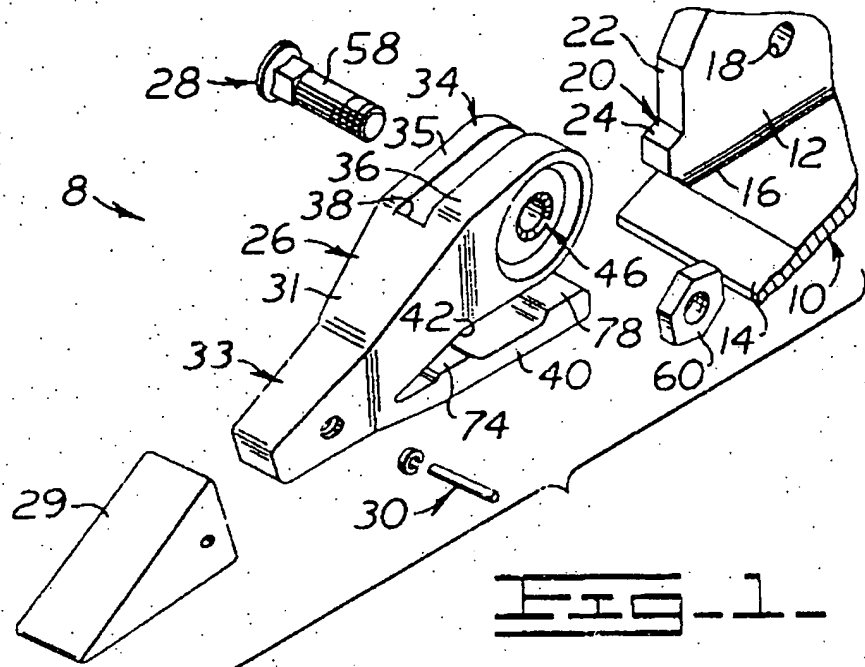


FIG. 1

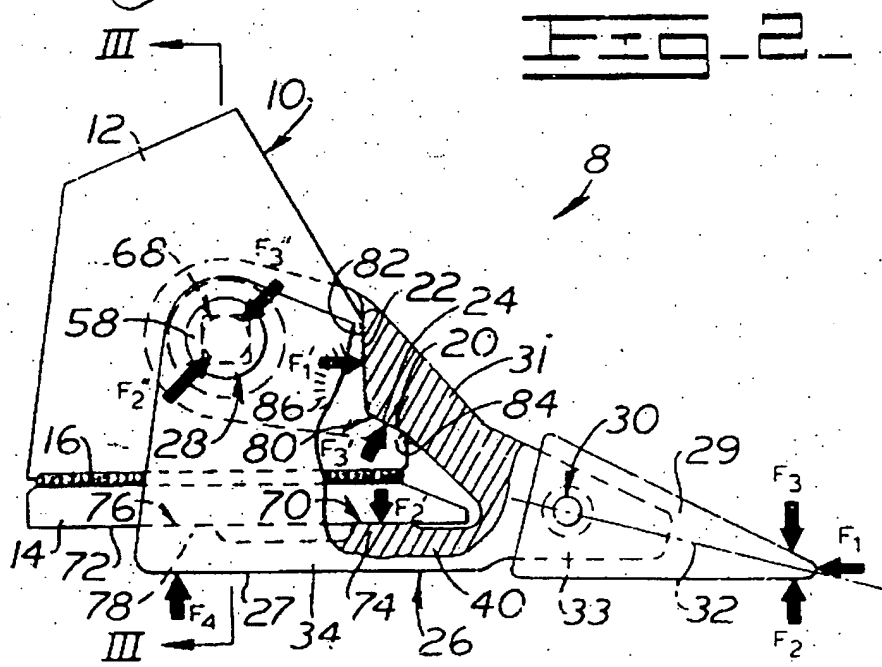


FIG. 2

